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Impact factors, the $h$-index, and citation hype – Metrics in research from the point of view of a journal editor

When we read a curriculum vitae, when we compare universities, when we decide where to publish a paper, when we discuss the journal landscape, a range of publication metric buzzwords surely but inadvertently pop up: should we choose the candidate with the highest $h$-index? Is ETH really not as good as MIT because it scores lower in the Shanghai ranking? Should we send our paper to the journal with the highest impact factor? Should the editors of a journal adjust their publication strategy to maximize the number of citations and, if so, short term or long term? I am serving as an associate editor for an American Chemical Society journal, Analytical Chemistry, and I am a member of several editorial advisory boards for other journals in my field. From these activities, I have some first-hand insight into the strategies of journals to improve their metrics. The thoughts in this short article express my personal opinion, but also come from the perspective and insights of a journal editor. Journals, publishers and editors are partly responsible for promoting and believing in metrics; some are downright obsessed with them.

Much has been said and written about metrics in research and in publishing. For example, I recommend reading the witty and lucid article written in CHIMIA by Molinié and Bodenhausen on this subject, “Bibliometrics as Weapons of Mass Citation” [1]. Although they have some limited value, I find many of the metrics irritating, and distracting from the main aim of science, which should be to advance knowledge and help translating this knowledge to improve the world we live in. There are a number of things that bother me:

- Metrics are often designed to reduce the value of a journal, a research program, a scientist, a university, or a paper to a single number. I find this totally insufficient. To me, this feels almost like “grading” your friends with numbers, such that the one with the highest grade becomes your best friend (or your spouse). There is much more to a friend than just a grade, and there is much more to the outcome of the scientific enterprise than some rank that is just a single number, because science is driven by people.

- As an editor handling a manuscript, I decide whether it eventually gets published or rejected. Rejection can happen at different stages: by editorial review alone, after consulting with another editor, or after one or several round of peer review. Many top journals, including Analytical Chemistry, have rejection rates well above 50%. One of the most difficult decisions an editor has to make is how to deal with manuscripts that contain very unusual approaches and ideas, which may be revolutionary but are destined to meet with resistance from the community. It is fairly easy to recognize high-quality mainstream...
work from successful laboratories that will pass peer review without difficulties and will likely generate some impact in the field of the journal (in the form of citations, to use one metric). On the other hand, scientific “singularities” might either rightfully belong in the trash, or they might be paradigm-changing “gold nuggets” that are much more difficult to spot. A good journal and its editors will get such “gold nugget papers” occasionally and must do all they can to spot these and have the courage to publish them if they believe in the quality. It is not unusual that such a paper will at first not get any of the regular, immediate attention, that it will not be cited nor written about in the secondary scientific literature – but it could be that years after publication, such a paper will be recognized by everyone as the landmark paper that opened a new field. In other words, if measured by some of the customary metrics (e.g., the “immediacy index”), such a paper should have never have been published. Clearly, this would be a grave mistake!

- A large number of citations does not always mean that there is great science in the paper that is being cited. It can sometimes be the opposite, that it was a paper that was completely flawed (e.g. “cold fusion”) or got a lot of attention due to some scandal.

- Metrics are often improperly used, sometimes in an amusing way. Consider the following: on hiring committees, I often see applications from candidates who list the impact factor of every journal they have published in. This is complete humbug! If anything, it’s the impact of the particular paper (e.g., number of citations it has generated) that should be listed, rather than an average rating for the entire journal. I remember one candidate whose “ultimate rating” in the CV consisted of the sum of all impact factors of the journals where this particular person’s papers had appeared …

- Metrics have the tendency to get uninformed and inexperienced researchers to behave in a certain way, to maximize the value of whatever metrics they have in mind. This, I believe is shortsighted, almost equivalent to producing as many short lived “likes” as possible on a social media website for scientific output – rather than focusing on creating profound and sustainable impact. When members of my research group ask me “could we publish in journal XYZ, because it has a higher impact factor than journal ABC?”, I explain to them that it is the value of their publication that counts, not the impact factor of the journal. For example the most highly cited paper from my own publication list has a rate of citations per year that is 26 times higher than the impact factor of the journal it appeared in. Every journal has a certain readership it reaches, in other words, a paper has to be well placed. It might not be seen by the target readership if “buried” in the wrong high-impact journal.

In summary, my opinion is that most if not all of the metrics are too simple to capture the true value of scientific advances. Metrics tend to be biased, and have to be interpreted with great caution. One should definitely not fall into the trap to adjust one’s research, publishing practice, or even one’s research field to optimize any given metric. Many of the metrics that gauge science may have been created for administrators or policy makers. The danger, of course, is that most administrators or policy makers have no other way of judging the value of scientific research, and may blindly take whatever metrics they see for face value. Science has become so diverse that even scientists can judge accomplishments outside of their specialty only with considerable effort, and may take the easy way out – to believe in some simplistic metrics. One of my favorite quotes on this aspect is one by Richard Ernst, Professor emeritus at the Department of Chemistry and Applied Biosciences, ETH Zurich, and winner of the 1991 Nobel prize in chemistry, who said: “Very simply, start reading the papers instead of merely rating them by counting citations!”

Acknowledgment: Author and publisher would like to thank Biman Nath for the permission of reproducing his cartoon http://www.rri.res.in/~biman/cartoon2.html

References

Citation: Zenobi R: Impact factors, the h-index, and citation hype – Metrics in research from the point of view of a journal editor. Infozine 2016, Special Issue 1, 31–32, DOI: 10.3929/ethz-a-010748945
Copyright: R. Zenobi, CC BY 4.0
Published: December 12, 2016

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